

The large white plume seen emitted from the stack on a cold day is not smoke but water vapor, which condenses on contact with the cooler air to form a dense white cloud.

the scrubber

At Hearn, too, Ontario Hydro made its first attacks on the problems of removing sulphur dioxide from flue gases using an experimental device nicknamed "The Scrubber". In The Scrubber, exhaust gases are forced through a mixture of limestone and water to form calcium sulphate and sulphite. Residues from the scrubbing action go to settling tanks where the solids are removed and the water re-cycled so there is no discharge to cause water pollution. Together with the fly ash trapped earlier through mechanical and electrical precipitators, solids from the settling tanks are disposed of as land fill.

A large version of the Hearn scrubber is in the development stage at Lakeview generating station, a few miles to the west.

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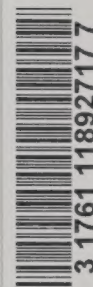
summary of engineering data

Steam Generators	Units 1 to 4	Units 5 to 8
Design Pressure	1000 psig	2200 psig
Design Steam		
Output (max)	850 x 10 ³ lb/ hr	1350 x 10 ³ lb/ hr
Steam Outlet		
Conditions	875 psig/ 900°F	1900 psig/ 1000°F
Fuel Consumption		
per boiler - coal	Gas firing only	70 ton/ hr
- gas	1.3 x 10 ⁶ ft ³ / hr	2.2 x 10 ⁶ ft ³ / hr
Turbo-Generators		
Type	Tandem Compound	Gross Compound
Steam Inlet		
Conditions - Superheat	850 psig/ 900°F	1800 psig/ 1000°F
- Reheat	No Reheat	390 psig/ 1000°F
Speed	1800 r.p.m.	3600/ 1800 r.p.m.
Normal Generator		
Rating	100 MW at 0.85pf	200 MW at 0.85pf
Generator Voltage	13,800 volts	13,800 volts
Transmission Voltage	115,000 volts	115,000 volts
Condenser Surface		
Area	60,000 ft ²	90,000 ft ²
Circulating Water		
Flow (max)	43,000 gpm (Imp)	114,000 gpm (Imp)

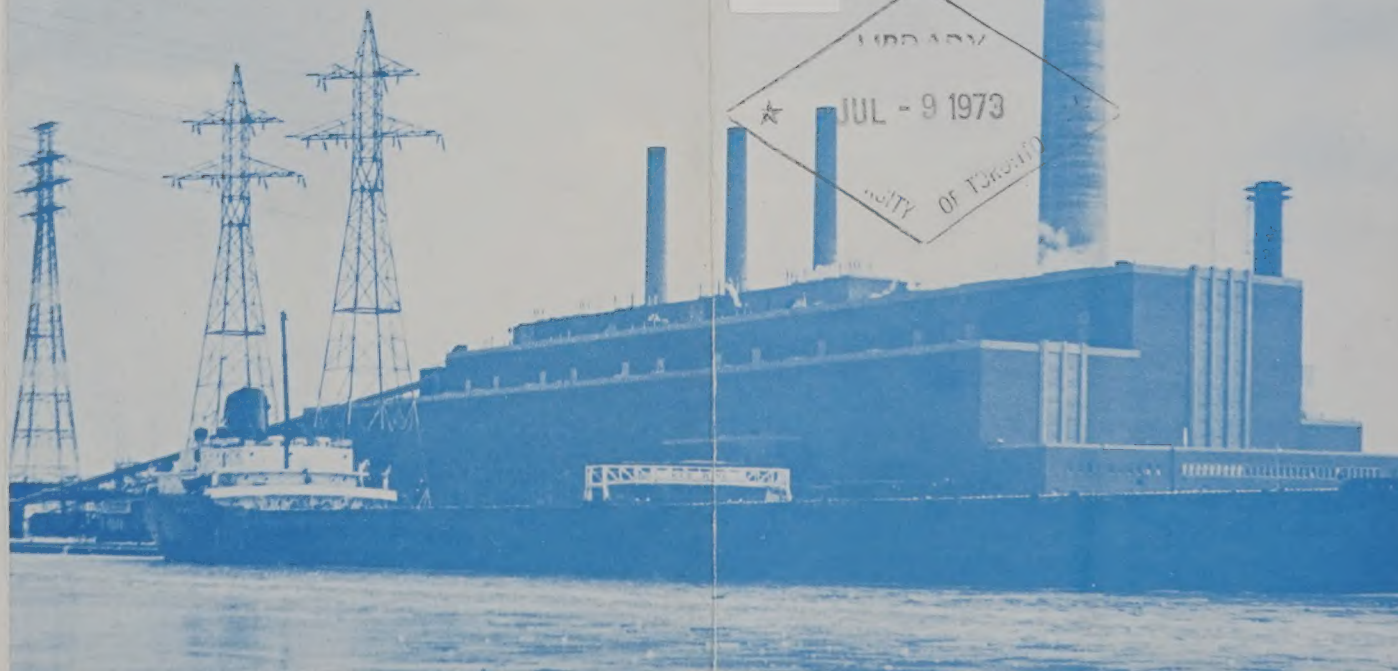
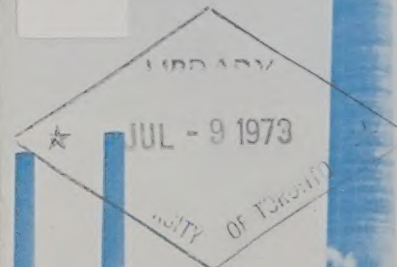
Richard L. Hearn Government Publications generating station

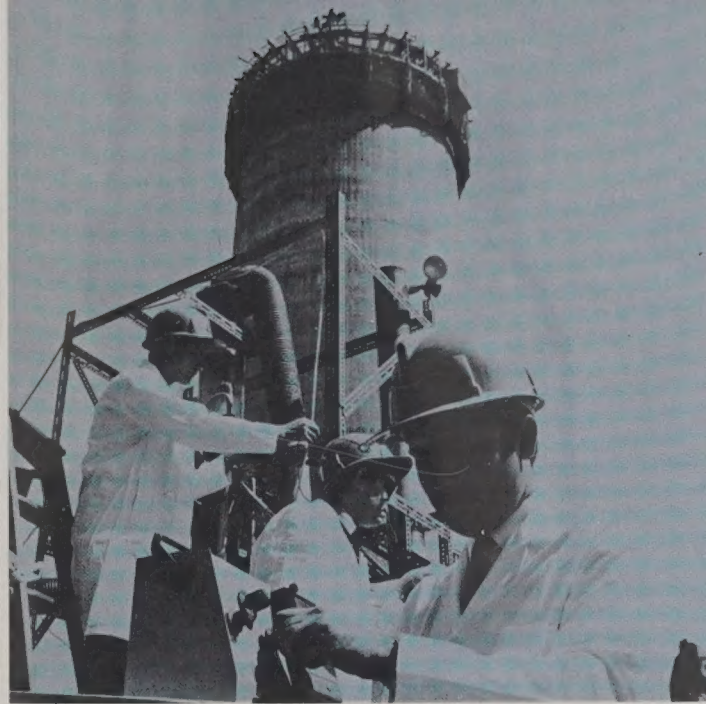
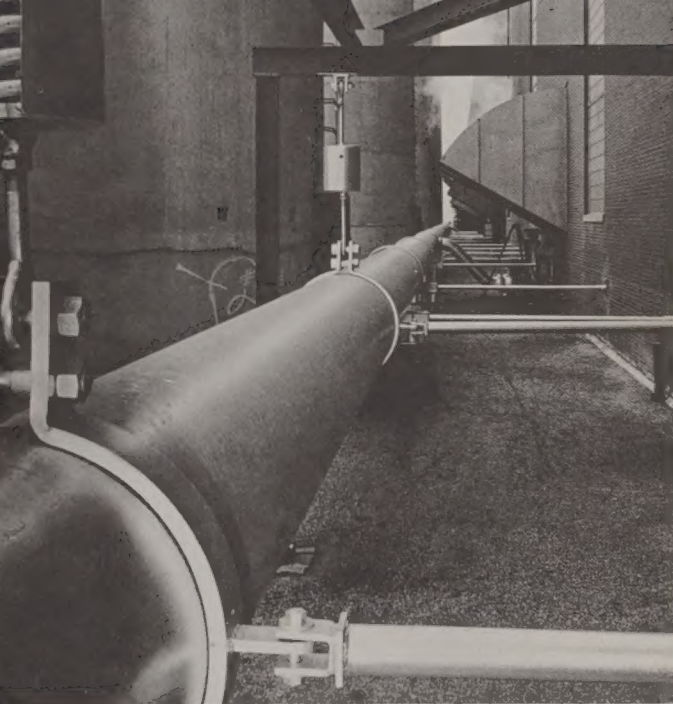
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The Richard L. Hearn generating station is the first thermal-electric plant in the Ontario Hydro system to be converted to natural gas fuel.

But the "old faithful" of Toronto's waterfront has long been in the forefront of electrical development. It was Ontario's first major thermal generating plant, producing 1,200,000 kilowatts of power.

It seems natural, then, that the Hearn station should become Ontario Hydro's flagship in the continuing battle to reduce air pollution—for that, essentially, is the reason behind the conversion from coal to natural gas.

Natural gas has practically no sulphur content, thus its utilization reduces ground-level concentrations of sulphur dioxide in the Metro Toronto area. In addition, it eliminates the emission of particulate matter.

The conversion involved capital expenditures of \$6 million and the station's fuel costs are expected to rise by about \$5 million annually.

It is interesting to note here that Ontario Hydro has

already spent or committed \$58 million for equipment to combat air pollution.

Hearn's four 100,000-kilowatt units burn natural gas exclusively. The remaining four 200,000-kilowatt units have been modified to burn either gas or coal, or a combination of both. Part of the gas supply is on an interruptible basis, and the choice of fuels provides a buffer against possible breakdown in the gas supply or shortages during periods of high demand.

coal vessels

Named after Dr. Richard L. Hearn, who for many years was Hydro's general manager and chief engineer and later its chairman, the station on Unwin Avenue is well situated to serve the Toronto area. It is close to a source of cooling water and to docking facilities for coal-carrying vessels.

Plant construction began in 1949 and, by mid-1953, four 100,000-kilowatt units were in operation. As electrical demand increased, four 200,000-kilowatt units were installed, bringing the total station

capacity to 1,200,000 kilowatts.

Coal-carrying ships up to 28,000 tons in capacity discharge their cargoes at the station stockpile, the site of which is large enough to store 1,535,000 tons.

Coal can be conveyed from this stockpile to the station at up to 1,500 tons an hour. In the station, the coal is ground by pulverizers to the fineness of talcum powder and is then blown by jets into the furnace where it burns in air suspension. Operating on coal at full load, each of the four 200,000-kilowatt units requires 70 tons an hour.

Normally, coal will only be used to meet load demands during the four coldest months of the year. Annual coal consumption will be reduced to about 20 per cent of the average burned in recent years.

by pipeline

Natural gas reaches Hearn through a 25-mile pipeline built by Consumers' Gas, who have contracted to supply the station with 49 billion cubic feet of gas annually. Additional gas is obtainable on an interruptible basis.

Each 100,000-kilowatt unit requires 1.2 million cubic feet of gas an hour. The larger, gas-coal, 200,000-kilowatt units may consume as much as two million cubic feet an hour—enough to supply the average home for about 12 years.

Spent steam from the turbines flows to condensers where it again becomes water and is returned to the boilers to begin another cycle. To remove the heat liberated in this process, cooling water is drawn from the ship channel just north of the station. After passing through the condensers this water is returned to Lake Ontario south of the plant only slightly warmer but no less clean.

new stack

Another major anti-pollution measure at Hearn station is the 700-foot high chimney, completed in late 1971, that replaced the plant's original eight smokestacks.

Built at a cost of \$9 million, it has a concrete shell with a 28-foot diameter steel liner, between which are access platforms and ladders to permit maintenance. It is 62 feet wide at the base and 36 feet at the top, and rests on an octagonal concrete pad 95 feet wide and 11 feet thick.

The giant stack discharges flue gases high into the atmosphere where they are rapidly dispersed, thereby lowering pollution levels.